HHS Public Access

Author manuscript

Sex Transm Dis. Author manuscript; available in PMC 2016 July 01.

Published in final edited form as:

Sex Transm Dis. 2016 February ; 43(2): 87–93. doi:10.1097/OLQ.0000000000000393.

Estimating the Prevalence and Predictors of Incorrect Condom Use Among Sexually Active Adults in Kenya: Results From a Nationally Representative Survey

Michael A. Grasso, MPH[*], **Sandra Schwarcz, MD**[*], **Jennifer S. Galbraith, PhD**[†], **Helgar Musyoki, MPH**[‡], **Caroline Kambona**[§], **Timothy A. Kellogg, MA**[*], and **for the KAIS Study Group**

[*]Global Health Sciences, University of California, SanFrancisco, San Francisco, CA

[†]Prevention Branch, DGHA, CDC-Kenya, Nairobi, Kenya

[‡]National AIDS and STI Control Program, Nairobi, Kenya

[§]Kenya Medical Research Institution, Nairobi, Kenya

Abstract

Background—Condom use continues to be an important primary prevention tool to reduce the acquisition and transmission of HIV and other sexually transmitted infections. However, incorrect use of condoms can reduce their effectiveness.

Methods—Using data from a 2012 nationally representative cross-sectional household survey conducted in Kenya, we analyzed a subpopulation of sexually active adults and estimated the percent that used condoms incorrectly during sex, and the type of condom errors. We used multivariable logistic regression to determine variables to be independently associated with incorrect condom use.

Results—Among 13,720 adolescents and adults, 8014 were sexually active in the previous 3 months (60.3%; 95% confidence interval [CI], 59.0–61.7). Among those who used a condom with a sex partner, 20% (95% CI, 17.4–22.6) experienced at least one instance of incorrect condom use in the previous 3 months. Of incorrect condom users, condom breakage or leakage was the most common error (52%; 95% CI, 44.5–59.6). Factors found to be associated with incorrect condom use were multiple sexual partnerships in the past 12 months (2 partners: adjusted odds ratio [aOR], 1.5; 95% CI, 1.0–2.0; $P = 0.03$; ≥3: aOR, 2.3; 95% CI, 1.5–3.5; $P < 0.01$) and reporting symptoms of a sexually transmitted infection (aOR, 2.8; 95% CI, 1.8–4.3; $P < 0.01$).

Conclusions—Incorrect condom use is frequent among sexually active Kenyans and this may translate into substantial HIV transmission. Further understanding of the dynamics of condom use and misuse, in the broader context of other prevention strategies, will aid program planners in the delivery of appropriate interventions aimed at limiting such errors.

Correspondence: Michael A. Grasso, University of California, San Francisco, San Francisco, CA. mikegrassosf@hotmail.com.

Disclaimer: The findings and conclusions in this article are those of the authors and do not necessarily represent the official position of the US Centers for Disease Control and Prevention or the Government of Kenya.

Conflict of interest: None declared.

With nearly 1.2 million persons living with HIV and 106,000 new infections, Kenya has one of the highest burdens of HIV infection in the world.[1] The most recent Kenya National AIDS Strategic Plan calls for providing coordinated, comprehensive high-quality combination prevention options aimed at controlling the epidemic.[2] In recent years, Kenya has expanded prevention efforts which now include increased HIV testing and counseling options, widely available voluntary medical male circumcision, and broader use of antiretroviral treatment to achieve viral suppression and thereby reduce HIV transmission. Also, although prevention strategies have expanded over the past 3 decades of HIV prevention programming, promotion of condom use continues to be a fundamental strategy to reduce the risk of acquiring and transmitting HIV and other sexually transmitted infections (STIs).[3] Central to an argument that a condom should be used consistently presumes that it should be used correctly throughout the duration of sex. Any breach of use presents an opportunity for HIV transmission. As such, gathering data on the types and prevalence of incorrect condom use is necessary to determine the need for targeted interventions to improve the effectiveness of condom use.

A recent systematic review of 50 published articles of condom use errors found a wide range but generally high percentage of condom users reporting incorrect condom use.[4] Common errors and problems included not using condoms throughout intercourse (late application, early removal) and condom breakage, slippage, and leakage.[4] Although obtaining precise estimates can be challenging due to different recall periods, framing of questions, and populations studied, the literature indicates that the proportion of individuals who experienced incomplete condom use ranged from 13.6% to 51.1%.[5–12] Condom breakage estimates ranged from 0.8% to 40.7%[5,6,8–11,13–18] and condom slippage during sex between 13.1% and 19.3%.[8–10] Reported condom leakage estimates are 7.6% and 12.5% for men and women, respectively.[8,9]

It is important to note that the range of estimates reflect varying recall periods, and many of these studies were targeted toward specific groups such as STI clinic attendees, university students, and other high-risk populations. In addition, nearly all were conducted in North America and other areas with concentrated HIV epidemics. None were from Africa. In this present study, we used data from a nationally representative population-based study in Kenya in 2012 to estimate the prevalence and independent predictors of incorrect condom use, and the frequency of selected types of condom errors among sexually active adults and adolescents.

Materials and Methods

Study Design, Population, and Data Collection

The 2012 Kenya AIDS Indicator Survey (KAIS) was a nationally representative cross-sectional household survey conducted among adults and children. The methods used in KAIS 2012 are described in detail elsewhere.[19] Briefly, a stratified 2-stage cluster sampling design was used to select households and, within households, to select eligible participants (residents of the household between the ages of 18 months and 64 years and guests who had slept in the home the prior night). Consenting participants were administered a face-to-face interview in a private setting in or near the home. Data collection occurred between October

2012 and February 2013. Because of regional insecurity, the North Eastern region of the country was not surveyed. This analysis is restricted to male and female participants aged 15 to 64 years who reported having had sex in the 3 months before the interview.

Measures

Participants were asked questions regarding their household and demographic characteristics including age, current marital status, past widowhood, educational attainment, residential setting, perceived risk for HIV infection, and HIV testing history and, if tested previously, the results of their last HIV test. Participants who were sexually active, defined as having sex in the previous 3 months, were asked about a number of behaviors and conditions in the previous 12 months including symptoms or diagnoses of STI, the number of sex partners, and if condoms were consistently used with each partner during sexual intercourse.

To minimize recall bias, only sexually active participants who reported using a condom in the 3 months before the interview were asked 4 specific questions about incorrect condom use while having sexual intercourse. These questions were as follows: (1) “Did you or your partner ever put the condom on after you had already started having sex?” (2) “Did you or your partner ever take the condom off before you were finished having sex?” (3) “Did the condom break or leak during sexual intercourse or while pulling it out?” and (4) “Did the condom slip-off during sex or while pulling out?” Incorrect condom users were defined as those who responded “yes” to one or more of the questions on incorrect condom use. Correct condom users were defined as those who answered “no” to all incorrect condom use questions. Participants who did not answer “yes” to any of these questions but responded “don't know” to one or more questions were classified as “unknown.”

Statistical Analyses

All analyses were performed in SAS 9.3 (SAS Institute Inc, Cary, NC) using the sample survey procedures to take into account the sampling design (stratification, sample weighting, and clustering) and with an appropriate domain constructed to analyze sexually active adults for subpopulation analyses. Sampling weights were adjusted to account for household nonresponse. The KAIS 2012 sample was stratified by 9 geographical regions and by urban/rural classification, except Nairobi, which is entirely an urban setting. Weighted percentages and 95% confidence intervals (CIs) were generated for population-level characteristics and estimates of correct and incorrect condom use. The Rao-Scott χ^2 was used to test for statistically significant differences in proportions of incorrect condom use across demographic behavioral characteristics. Variables found to be significant at a P value less than 0.2 in bivariate analysis were selected for multivariable logistic regression modelling. Variables were removed from the final model using a backward elimination process. All variables in the final model with a P value less than 0.05 were considered significant. Using logistic regression analysis, we calculated adjusted odds ratios (aORs) and 95% CI to identify variables associated with incorrect condom use.

Ethical Considerations

The Kenya Medical Research Institute Ethical Review Committee, the US Centers for Disease Control and Prevention Institutional Review Board, and the Committee on Human

Research of the University of California, San Francisco, reviewed and approved the KAIS 2012 protocol.

Results

A total of 13,720 adolescents and adults were sampled and 8014 of these were sexually active in the previous 3 months (60.3%; 95% CI, 59.0–61.7). Of these, slightly more were men than were women, and most were younger than 40 years, attained at least primary education, were married, were Christian, and resided in rural areas (Table 1). The distribution of adults across the 5 tiers of the household wealth index[20] was similar, with 17.6% (95% CI, 15.0–20.1) in the lowest-income tier, 19.8% (95% CI, 17.8–21.8) in the second-income tier, 20.2% 95% CI, 18.2–22.1) in the middle-income tier, 19.8% (95% CI, 17.6–22.0) in the fourth-income tier, and 22.7% (95% CI, 19.9–25.6) in the highest-income tier. Condom use with any partner in the previous 3 months was reported by 1430 (18.7%; 95% CI, 17.4–20.0) of adults. Forty-one percent (95% CI, 38.9–43.4) considered themselves to be at a small risk for HIV and 29.7% (95% CI, 27.8–31.6) perceived themselves at no risk. Although most described themselves to be HIV negative, nearly 1 (24.1%) in 4 (95% CI, 22.5–25.6) adults had either not previously tested or tested but had not received their results. Most (87.0%; 95% CI, 85.9–88.0) had 1 sex partner in the previous 12 months. Symptoms and diagnosis of an STI and transactional sex were infrequent. Among men, 92.2% (95% CI, 90.5–94.0) reported being circumcised.

Among persons who used a condom with any sexual partner in the 3 months before the survey, 20.0% (95% CI, 17.4–22.6) had at least one instance of incorrect condom use (Table 2). Sociodemographic factors, perceived HIV risk, and self-reported HIV-infection were not associated with incorrect condom use. Incorrect condom use was significantly associated with the number of sex partners in the previous 12 months ($P < 0.01$). Specifically, among adults with 1 sex partner in the past 12 months, 17.1% (95% CI, 14.1–20.0) reported incorrect condom use. Among those who reported 2 partners in the past 12 months, 22.8% (95% CI, 17.3–28.3) reported incorrect condom use. Among those with 3+ sexual partners in the past 12 months, 33.4% (95% CI, 25.3–41.4) reported incorrect condom use. Incorrect condom use was also associated with having STI symptoms in the previous 12 months ($P < 0.01$), with 40.3% (95% CI, 31.2–49.5) of persons with an STI symptom having used condoms incorrectly, whereas only 18.5% (95% CI, 15.8–21.1) of persons without symptoms used condoms incorrectly. Adults with an STI diagnosis reported incorrect condom use compared with those without a diagnosis (44.3% [95% CI, 22.8–65.9] vs. 19.5% [95% CI, 16.9–22.1], $P < 0.01$). Similarly, a greater percentage of adults reporting transactional sex reported higher incorrect condom use compared with adults without transactional sex (30.0% [95% CI, 21.6–38.4] vs. 18.8% [95% CI, 16.1–21.5], $P < 0.01$). In addition, adults who did not use condoms consistently with all sex partners in the past 12 months reported a greater percentage of incorrect condom use compared with adults who used condoms consistently with all partners (22.8% [95% CI, 19.3–26.4] vs. 16.7% [95% CI, 13.2–20.1], $P = 0.01$).

Among incorrect users of condoms, the most frequently reported specific condom error was condom breakage or leakage (52%; 95% CI, 44.5–59.6; Table 3). Late application or early

removal of the condom was reported by 45.4% (95% CI, 37.7–53.1) and 29.8% (95% CI, 23.7–35.8), respectively. Condom slippage was the least frequently reported error. There were 2 types of errors that differed by sex. A significantly greater percentage of women than men reported using a condom after initiation of sex and a greater percentage of men than women experienced condom breakage or leakage. Most respondents reported a single type of condom error (62.6%; 95% CI, 56.0–69.3) and one quarter reported 2 types of errors.

In bivariate analysis, household wealth index, region, perception of HIV risk, number of sex partners, having STI symptoms in the past 12 months, having been diagnosed as having an STI in the past 12 months, history of transactional sex, and consistent condom use with all partners in the past 12 months were all associated with incorrect condom use at or below a *P* value cutoff of 0.20 (Table 4) and considered potential predictors. After controlling for all variables included in the multivariable logistic regression, we found that, compared with having had 1 sex partner in the prior 12 months, reporting 2 partners increased the risk of incorrect condom use by 50% (aOR, 1.5; 95% CI, 1.0–2.0) and that having had 3 or more partners more than doubled this risk and odds ratio (aOR, 2.3; 95% CI, 1.5–3.5; Table 4). Reporting symptoms of an STI was associated with a nearly 3-fold increase in the risk of incorrect condom use (aOR, 2.8; 95% CI, 1.8–4.3).

Discussion

In this nationally representative survey, 20% of recent users of condoms used them incorrectly. Our findings are consistent with other studies of the prevalence of incorrect condom use, and specifically for measures of incomplete use,[5–10,12] condom breakage and leakage,[5–11,15,16] and slippage,[6,8–10,15] suggesting the potential for increased risk of acquiring or transmitting HIV other STI, and unanticipated pregnancy in the population.

All types of condom errors were frequently reported; however, most adults experienced only one. Given that the survey instrument collected only 4 measures of incorrect condom use, it is possible that other condom errors occurred but were not available for broader analysis. Also, individuals who report condom breakage or slippage may do so as an outcome of other errors, such as mishandling condoms before use, as suggested in Sanders et al.[4] Still, we found 25% of those who incorrectly used condoms experienced more than 1 type of error. This broad pattern of improper use may reflect a lack of knowledge of proper condom use, inexperience, or poor planning or judgment. One study found that receiving a condom demonstration was the strongest predictor of correct condom use knowledge among adolescents in sub-Saharan Africa,[21] and in another study, never receiving instruction on correct condom use was associated with breakage or slippage.[22] Although HIV and STI-focused health care settings may have properly trained staff and training materials, it is quite possible that persons who do not access these sites may never be taught how to use condoms. Given this, empowering individuals outside these settings with knowledge and training for proper condom use as well as informing individuals on ways to improve the condom use experiences such as individual condom selection, considering attributes such as size, feel, cost and availability as described by Crosby et al,[23] may increase the frequency and proper use of condoms.[24]

We found the odds of incorrect condom use increasing with the number of partners independent of other factors. Although we did not measure condom use by number of acts, this association of incorrect condom use by increasing number of partners in the past 12 months may reflect a per-contact risk that results in greater risk of error with increasing number of episodes (represented by the increase in the number of partners). There may be other factors associated with persons who have more than 1 partner that can explain this difference such as less access to prevention messages or lack of specific education and training on proper condom use. Additional exploration of this association and measures of incorrect condom use per episode is warranted.[10] The higher risk of incorrect condom use in the presence of a history of an STI may reflect acquisition of STI as a result of improper condom use or discomfort using condoms in the presence of STI symptoms. In future studies, assessing the temporal relationship between these 2 factors should be considered.

Our study is subject to a number of limitations. First, we think that incorrect condom use may be underreported because we relied on self-reported behaviors which are subject to social desirability and recall biases.[25] Second, we did not collect data on concomitant use of contraceptive gels or lubricants which may impact the integrity of condoms. Third, the survey was limited to 4 types of incorrect condom use. When considering the period between condom acquisition and storage, to actual use throughout the duration of sexual intercourse, over a dozen potential scenarios not collected in this survey, such as using expired condoms and not squeezing the tip of the condom before use, may have identified additional incorrect users. Therefore, our findings may underestimate the true proportion of persons using condoms incorrectly. The survey combined condom breakage and slippage as one variable preventing individual analysis on 2 different types of events. Because of security concerns in the North Eastern region, sampling was not conducted in this area. Results from KAIS 2007 indicate that this area had the lowest HIV prevalence rate in the country and represented only 2% of the national sample, suggesting minimal impact, if any, to the generalizability of these national results. Finally, the findings from this study may not be representative of populations in other countries or of selected high-risk populations such as men who have sex with men.

Our study does, however, provide a nationally representative minimum estimate of the magnitude of incorrect condom use in a low-income country with high HIV prevalence and a generalized epidemic that can be used in prioritizing and enhancing prevention strategies. If Kenya continues to recommend condoms for primary HIV prevention, researchers and service-delivery platforms should implement effective methods for educating individuals, including those diagnosed as having an STI, on consistent and correct use of condoms. To do so may require additional quantitative and qualitative research to understand the dynamics involved in condom use and condom misuse. At a minimum, prevention programs should include education and training that specifically addresses common types of incorrect condom use and how to minimize these incidents.

Acknowledgments

The authors acknowledge the KAIS Study Group for their contribution to the design of the survey and collection of the data set: Willis Akhwale, Sehin Birhanu, John Bore, Angela Broad, Robert Buluma, Thomas Gachuki, Jennifer Galbraith, Anthony Gichangi, Beth Gikonyo, Margaret Gitau, Joshua Gitonga, Mike Grasso, Malayah Harper,

Andrew Imbwaga, Muthoni Junghae, Mutua Kakinyi, Samuel Mwangi Kamiru, Nicholas Owenje Kandege, Lucy Kanyara, Yasuyo Kawamura, Timothy Kellogg, George Kichamu, Andrea Kim, Lucy Kimondo, Davies Kimanga, Elija Kinyanjui, Stephen Kipkerich, Dan Koros, Danson Kimutai Koske, Boniface O. K'Oyugi, Veronica Lee, Serenita Lewis, William Maina, Ernest Makokha, Agneta Mbithi, Joy Mirjahangir, Ibrahim Mohamed, Rex Mpazanje, Nicolas Muraguri, Patrick Mureithi, Lilly Muthoni, James Muttunga, Jane Mwangi, Mary Mwangi, Sophie Mwanyumba, Silas Mulwa, Francis Ndichu, Anne Ng'ang'a, James Ng'ang'a, John Gitahi Ng'ang'a, Lucy Ng'ang'a, Carol Ngare, Bernadette Ng'eno, Inviolata Njeri, David Njogu, Bernard Obasi, Macdonald Obudho, Edwin Ochieng, Linus Odawo, James Odek, Jacob Odhiambo, Caleb Ogada, Samuel Ogola, David Ojakaa, James Kwach Ojwang, George Okumu, Patricia Oluoch, Tom Oluoch, Kenneth Ochieng Omondi, Osborn Otieno, Yakubu Owolabi, Bharat Parekh, George Rutherford, Sandra Schwarcz, Shahnaaz Sharrif, Victor Ssempiijja, Lydia Tabuke, Yuko Takenaka, Mamo Umuro, Brian Eugene Wakhutu, Celia Wandera, John Wanyungu, Wanjiru Waruiru, Anthony Waruru, Paul Waweru, Larry Westerman, and Kelly Winter.

References

1. National AIDS and STI Control Programme (NASCOP), Kenya. Kenya AIDS Indicator Survey 2012: Final Report. Nairobi: NASCOP; 2014.
2. National AIDS Control Council. Kenya National AIDS Strategic Plan 2009/10–2012/13. Nairobi, Kenya: NACC; 2009. Available at: http://www.nacc.or.ke [Accessed February 18, 2015]
3. Westercamp N, Mattson CL, Madonia M, et al. Determinants of consistent condom use vary by partner type among young men in Kisumu, Kenya: A multi-level analysis. AIDS Behav. 2010; 14:949–959. [PubMed: 18791819]
4. Sanders SA, Yarber WL, Kaufman EL, et al. Condom use errors and problems: A global view. Sex Health. 2012; 9:81–95. [PubMed: 22348636]
5. Grimley DM, Annang L, Houser S, et al. Prevalence of condom use errors among STD clinic patients. Am J Health Behav. 2005; 29:324–330. [PubMed: 16006229]
6. Paz-Bailey G, Koumans EH, Sternberg M, et al. The effect of correct and consistent condom use on chlamydial and gonococcal infection among urban adolescents. Arch Pediatr Adolesc Med. 2005; 159:536–542. [PubMed: 15939852]
7. Allman D, Xu K, Myers T, et al. Delayed application of condoms with safer and unsafe sex: Factors associated with HIV risk in a community sample of gay and bisexual men. AIDS Care. 21:775–784. [PubMed: 19806491]
8. Crosby RA, Sanders SA, Yarber WL, et al. Condom use errors and problems among college men. Sex Transm Dis. 2002; 29:552–557. [PubMed: 12218848]
9. Sanders SA, Graham CA, Yarber WL, et al. Condom use errors and problems among young women who put condoms on their male partners. J Am Med Womens Assoc. 2003; 58:95–98. [PubMed: 12744422]
10. Crosby R, Sanders S, Yarber WL, et al. Condom-use errors and problems: A neglected aspect of studies assessing condom effectiveness. Am J Prev Med. 2003; 24:367–370. [PubMed: 12726876]
11. Crosby R, Salazar LF, DiClemente RJ, et al. Condom misuse among adjudicated girls: associations with laboratory-confirmed chlamydia and gonorrhea. J Pediatr Adolesc Gynecol. 2007; 20:339–343. [PubMed: 18082855]
12. Crosby RA, Yarber WL, Graham CA, et al. Does it fit okay? Problems with condom use as a function of self-reported poor fit Sex. Transm Infect. 2010; 86:36–38.
13. Crosby R, Salazar LF, DiClemente RJ, et al. Accounting for failures may improve precision: evidence supporting improved validity of self-reported condom use. Sex Transm Dis. 2005; 32:513–515. [PubMed: 16041255]
14. Crosby R, Mettey A. A descriptive analysis of HIV risk behavior among men having sex with men attending a large sex resort. J Acquir Immune Defic Syndr. 2004; 37:1496–1499. [PubMed: 15602128]
15. Choi SY, Chen KL, Jiang ZQ. Client-perpetuated violence and condom failure among female sex workers in southwestern China. Sex Transm Dis. 2008; 35:141–146. [PubMed: 17921913]
16. Steiner MJ, Taylor D, Hylton-Kong T, et al. Decreased condom breakage and slippage rates after counseling men at a sexually transmitted infection clinic in Jamaica. Contraception. 2007; 75:289–293. [PubMed: 17362708]

17. deVisser RO, Smith AM, Rissel CE, et al. Sex in Australia: Experience of condom failure among a representative sample of men. Aust N Z J Public Health. 2003; 27:217–222. [PubMed: 14696714]
18. Kirkkola AL, Mattila K, Virjo I. Problems with condoms—A population-based study among Finnish men and women. Eur J Contracept Reprod Health Care. 2005; 10:87–92. [PubMed: 16147812]
19. Waruiru W, Kim AA, Kimanga DO, et al. The Kenya AIDS Indicator Survey 2012: Rationale, methods, description of participants, and response rates. J Acquir Immune Defic Syndr. 2014; 66(suppl 1):S3–S12. [PubMed: 24732819]
20. Rutstein, SO.; Johnson, K. DHS Comparative Reports 6: The DHS Wealth Index. Calverton, MD: ORC Macro, MEASURE DHS; 2004.
21. Bankole A, Ahmed FH, Neema S, et al. Knowledge of correct condom use and consistency of use among adolescents in four countries in sub-Saharan Africa. Afr J Reprod Health. 2007; 11:197–220. [PubMed: 18458741]
22. Yarber WL, Graham CA, Sanders SA, et al. Correlates of condom breakage and slippage among university undergraduates. Int J STD AIDS. 2004; 15:467–472. [PubMed: 15228732]
23. Crosby RA, Milhausen RR, Mark KP, et al. Understanding problems with condom fit and feel: An important opportunity for improving clinic-based safer sex programs. J Prim Prev. 2013; 34:109–115. [PubMed: 23355256]
24. Bradley J, Rajaram S, Alary M, et al. Determinants of condom breakage among female sex workers in Karnataka, India. BMC Public Health. 2011; 11(suppl 6):S14. [PubMed: 22376237]
25. Fenton KA, Johnson AM, McManus S, et al. Measuring sexual behaviour: Methodological challenges in survey research. Sex Transm Infect. 2001; 77:84–92. [PubMed: 11287683]

Table 1

Select Characteristics Among Sexually Active Persons Aged 15 to 64 Years by Report of Condom Use in the Past 3 Months, KAIS 2012

Characteristic	Unweighted n (%)	Weighted % (95% CI)
Total	8014 (100)	—
Sex		
Men	3567 (44.5)	50.9 (49.7–52.1)
Women	4447 (55.5)	49.1 (47.9–50.3)
Age group, y		
15–24	1692 (21.1)	20.8 (19.6–22.0)
25–29	1574 (19.6)	19.5 (18.4–20.6)
30–39	2320 (28.9)	28.7 (27.5–29.9)
40–49	1419 (17.7)	18.1 (17.0–19.2)
50–59	803 (10.0)	10.2 (9.3–11.1)
60–64	206 (2.6)	2.6 (2.1–3.0)
Highest level of educational achievement		
None	701 (8.7)	5.7 (4.5–6.9)
Incomplete primary school	553 (6.9)	6.4 (5.4–7.3)
Complete primary school	2595 (32.4)	32.8 (31.2–34.5)
Secondary school or higher	4165 (52.0)	55.1 (53.2–56.9)
Marital status		
Never married/cohabiting	950 (11.9)	12.6 (11.5–13.6)
Single	101 (1.3)	1.2 (0.9–1.5)
Widowed	67 (0.8)	0.9 (0.7–1.1)
Separated/divorced	211 (2.6)	2.7 (2.3–3.1)
Married/cohabiting	6684 (83.4)	82.7 (81.5–83.9)
Wealth index		
Lowest	1454 (18.1)	17.6 (15.0–20.1)
Second	1624 (20.3)	19.8 (17.8–21.8)
Middle	1593 (19.9)	20.2 (18.2–22.1)
Fourth	1573 (19.6)	19.8 (17.6–22.0)
Highest	1770 (22.1)	22.7 (19.9–25.6)
Religion		
Roman Catholic	1815 (22.6)	24.0 (21.9–26.2)
Protestant/Other Christian	5197 (64.8)	67.2 (64.8–69.5)
Muslim	659 (8.2)	4.7 (3.4–6.1)
No religion/other	343 (4.3)	4.1 (3.0–5.1)
Residence		
Rural	4855 (60.6)	60.6 (58.0–63.3)
Urban	3159 (39.4)	39.4 (36.7–42.0)
Region		
Nairobi	1125 (14.0)	11.8 (10.6–13.0)

Characteristic	Unweighted n (%)	Weighted % (95% CI)
Central	972 (12.1)	13.7 (11.6–15.7)
Coast	996 (12.4)	9.2 (7.7–10.7)
Eastern	1393 (17.4)	15.6 (13.7–17.5)
Nyanza	1117 (13.9)	14.2 (12.4–16.0)
Rift Valley	1423 (17.8)	24.8 (22.1–27.4)
Western	988 (12.3)	10.7 (9.3–12.1)
Used a condom with any sex partners past 3 mo		
Yes	1430 (17.8)	18.7 (17.4–20.0)
No	6580 (82.1)	81.3 (79.9–82.6)
Don't know	4 (0.0)	0.0 (0.0–0.1)
Perception of HIV risk *		
No risk	2311 (29.1)	29.7 (27.8–31.6)
Small risk	3228 (40.6)	41.2 (38.9–43.4)
Moderate risk	890 (11.2)	10.8 (9.7–11.8)
Great risk	338 (4.3)	4.5 (3.9–5.0)
Known to be HIV infected	209 (2.6)	2.7 (2.2–3.3)
Don't know	965 (12.2)	11.1 (10.0–12.2)
Self-reported HIV status		
HIV positive	205 (2.6)	2.7 (2.1–3.3)
HIV negative	6009 (75.0)	73.3 (71.7–74.9)
Never tested/received results	1800 (22.5)	24.1 (22.5–25.6)
No. sex partners past 12 mo		
1 partner	7060 (88.1)	87.0 (85.9–88.0)
2 partners	616 (7.7)	8.6 (7.9–9.4)
3+ partners	273 (3.4)	3.7 (3.2–4.3)
Don't know	65 (0.8)	0.6 (0.4–0.9)
STI† symptoms in past 12 mo		
Yes	478 (6.0)	5.6 (5.0–6.3)
No	7462 (93.1)	93.7 (93.0–94.4)
Don't know	73 (0.9)	0.7 (0.5–1.0)
STI† diagnosis in past 12 mo		
Yes	75 (0.9)	1.0 (0.7–1.2)
No	7865 (99.1)	99.0 (98.8–99.3)
Gave or received sex in exchange for money or other commodity		
Yes	276 (3.4)	3.8 (3.2–4.5)
No	7738 (96.6)	96.2 (95.5–96.8)
Circumcision status (men only; n = 3567)		
Circumcised	3276 (92.1)	92.2 (90.5–94.0)
Uncircumcised	282 (7.9)	7.8 (6.0–9.5)

*There were 73 respondents who did not answer the risk perception question because they had not heard of HIV and were excluded from this analysis.

†STIs other than HIV.

Table 2

Select Characteristics Among Sexually Active Persons Aged 15 to 64 Years Who Report Correct and Incorrect Condom Use in the Past 3 Months by Condom Use, KAIS 2012

	Correct Condom Use		Incorrect Condom Use		
Characteristic	**n/N**	**Weighted % (95% CI)**	**n/N**	**Weighted % (95% CI)**	***P***
Overall	1145/1430	80.0 (77.4–82.6)	285/1430	20.0 (17.4–22.6)	—
Sex					0.71
Men	663/836	79.7 (76.6–82.9)	173/836	20.3 (17.1–23.4)	
Women	482/594	80.6 (76.8–84.4)	112/594	19.4 (15.6–23.2)	
Age group, y					0.68
15–24	432/554	78.4 (74.7–82.2)	122/554	21.6 (17.8–25.3)	
25–29	237/293	80.1 (74.6–85.6)	56/293	19.9 (14.4–25.4)	
30–39	278/346	79.3 (74.4–84.1)	68/346	20.7 (15.9–25.6)	
40–49	132/159	84.8 (78.8–90.8)	27/159	15.2 (9.2–21.2)	
50–59	57/68	83.1 (72.7—93.5)	11/68	16.9 (6.5–27.3)	
60–64	9/10	86.8 (62.9–100.0)	1/10	13.2 (0.0–37.1)	
Education					0.24
None	33/41	82.2 (68.6–95.7)	8/41	17.8 (4.3–31.4)	
Incomplete primary	55/79	70.1 (57.1–83.2)	24/79	29.9 (16.8–42.9)	
Complete primary	336/419	80.6 (76.4–84.8)	83/419	19.4 (15.2–23.6)	
Secondary or higher	721/891	80.6 (77.5–83.7)	170/891	19.4 (16.3–22.5)	
Marital status					0.37
Never married/cohabiting	437/559	77.9 (73.7–82.0)	122/559	22.1 (18.0–26.3)	
Single	37/42	87.0 (76.2–97.8)	5/42	13.0 (2.2–23.8)	
Married/cohabiting	591/726	81.4 (78.0–84.9)	135/726	18.6 (15.1–22.0)	
Widowed	16/18	88.4 (72.8–100.0)	2/18	11.6 (0.0–27.2)	
Separated/divorced	63/84	77.0 (67.8–86.3)	21/84	23.0 (13.7–32.2)	
Household wealth index					0.07
Lowest	161/188	86.6 (80.7–92.5)	27/188	13.4 (7.5–19.3)	
Second	190/260	75.4 (70.0–80.8)	70/260	24.6 (19.2–30.0)	
Middle	210/267	78.5 (73.1–83.9)	57/267	21.5 (16.1–26.9)	

	Correct Condom Use		Incorrect Condom Use		
Characteristic	**n/N**	**Weighted % (95% CI)**	**n/N**	**Weighted % (95% CI)**	***P***
Fourth	242/305	78.3 (72.7–83.8)	63/305	21.7 (16.2–27.3)	
Highest	342/410	81.9 (77.4–86.4)	68/410	18.1 (13.6–22.6)	
Religion					0.46
Roman Catholic	293/361	82.1 (77.9–86.4)	68/361	17.9 (13.6–22.1)	
Protestant/Other Christian	741/935	78.8 (75.7–81.8)	194/935	21.2 (18.2–24.3)	
Muslim	72/85	85.3 (76.1–94.5)	13/85	14.7 (5.5–23.9)	
No religion/other	39/49	82.3 (69.1–95.4)	10/49	17.7 (4.6–30.9)	
Residence					0.45
Rural	561/717	79.0 (75.6–82.5)	156/717	21.0 (17.5–24.4)	
Urban	584/713	81.1 (77.1–85.1)	129/713	18.9 (14.9–22.9)	
Region					0.08
Nairobi	225/275	81.3 (75.6–87.0)	50/275	18.7 (13.0–24.4)	
Central	88/117	73.9 (64.9–83.0)	29/117	26.1 (17.0–35.1)	
Coast	127/144	89.3 (83.4–95.1)	17/144	10.7 (4.9–16.6)	
Eastern	150/189	75.9 (66.5–85.3)	39/189	24.1 (14.7–33.5)	
Nyanza	224/285	79.2 (74.2–84.3)	61/285	20.8 (15.7–25.8)	
Rift Valley	212/254	83.7 (78.1–89.2)	42/254	16.3 (10.8–21.9)	
Western	119/166	74.7 (67.2–82.3)	47/166	25.3 (17.7–32.8)	
Perception of HIV risk					0.14
No risk	280/337	84.2 (79.9–88.5)	57/337	15.8 (11.5–20.1)	
Small risk	456/562	79.8 (76.0–83.5)	106/562	20.2 (16.5–24.0)	
Moderate risk	162/207	80.4 (74.8–86.0)	45/207	19.6 (14.0–25.2)	
Great risk	52/73	72.1 (61.3–82.8)	21/73	27.9 (17.2–38.7)	
Known to be infected	96/127	75.1 (66.2–84.1)	31/127	24.9 (15.9–33.8)	
Don't know	89/114	77.6 (70.2–85.0)	25/114	22.4 (15.0–29.8)	
Self-reported HIV status					0.25
HIV negative	842/1041	81.2 (78.5–83.8)	199/1041	18.8 (16.2–21.5)	
HIV positive	95/126	74.9 (65.9–83.9)	31/126	25.1 (16.1–34.1)	
Never tested/received results	208/263	78.3 (72.4–84.1)	55/263	21.7 (15.9–27.6)	
No. sex partners past 12 mo					<0.01

	Correct Condom Use		Incorrect Condom Use		
Characteristic	**n/N**	**Weighted % (95% CI)**	**n/N**	**Weighted % (95% CI)**	***P***
1 partner	842/1010	82.9 (80.0–85.9)	168/1010	17.1 (14.1–20.0)	
2 partners	198/263	77.2 (71.7–82.7)	65/263	22.8 (17.3–28.3)	
3+ partners	95/144	66.6 (58.6–74.7)	49/144	33.4 (25.3–41.4)	
Don't know	10/13	83.5 (55.6–100.0)	3/13	16.5 (0.0–44.4)	
STI symptoms in past 12 mo					<0.01
Yes	6 3/1 0 6	5 9 .7 (5 0 .5 –68.8)	43/106	40.3 (31.2–49.5)	
No	1072/1312	81.5 (78.9–84.2)	240/1312	18.5 (15.8–21.1)	
Don't know	9/11	79.8 (52.3–100.0)	2/11	20.2 (0.0–47.7)	
STI diagnosis in past 12 mo					<0.01
Yes	16/29	55.7 (34.1–77.2)	13/29	44.3 (22.8–65.9)	
No	1119/1389	80.5 (77.9–83.1)	270/1389	19.5 (16.9–22.1)	
Gave or received sex in exchange for money or other commodity					<0.01
Yes	102/147	70.0 (61.6–78.4)	45/147	30.0 (21.6–38.4)	
No	1043/1283	81.2 (78.5–83.9)	240/1283	18.8 (16.1–21.5)	
Consistent condom use *					0.01
Yes	530/638	83.3 (79.8–86.8)	108/638	16.7 (13.2–20.1)	
No	610/786	77.2 (73.6–80.7)	176/786	22.8 (19.3–26.4)	
Circumcision status (men only)					0.79
Circumcised	594/747	80.0 (76.7–83.3)	153/747	20.0 (16.7–23.3)	
Uncircumcised	68/86	78.7 (68.9–88.4)	18/86	21.3 (11.6–31.1)	

* Data missing for 6 participants.

Table 3

Frequency Distribution of Types of Condom Use Errors Among Sexually Active Persons Aged 15 to 64 Years by Sex With Any Partner in the Past 3 Months, KAIS 2012

	Total (n = 285)		Men (n = 173)		Women (n = 112)		
Characteristic	**Unweighted n**	**Weighted % (95% CI)**	**Unweighted n (%)**	**Weighted % (95% CI)**	**Unweighted n (%)**	**Weighted % (95% CI)**	***P***
Put on condom after	125	45.4 (37.7–53.1)	68	40.1 (31.2–49.0)	57	55.6 (45.3–65.8)	<0.01
Took off condom before completing sex	87	29.8 (23.7–35.8)	51	29.6 (22.4–36.8)	36	30.1 (20.8–39.3)	0.93
Condom broke/leaked during sex or while pulling out	141	52.0 (44.5–59.6)	95	57.6 (48.8–66.4)	46	41.5 (32.2–50.8)	<0.01
Condom slipped off during sex	73	26.2 (20.2–32.3)	42	25.8 (17.7–33.9)	31	27.0 (19.0–35.1)	0.83
No. incorrect condom use behaviors reported							0.38
1	182	62.6 (56.0–69.3)	109	60.9 (52.2–69.5)	73	65.9 (57.1–74.6)	
2	73	25.2 (19.3–31.0)	48	27.8 (20.3–35.3)	25	20.1 (12.6–27.6)	
3	22	8.4 (4.4–12.5)	13	8.7 (3.7–13.6)	9	8.0 (1.7–14.3)	
All 4	8	3.8 (1.0–6.5)	3	2.6 (0.0–5.7)	5	6.0 (0.61–11.4)	

Table 4

Results of Bivariate and Multivariate Analysis of Factors Associated With Incorrect Condom Use Among Sexually Active Persons Aged 15 to 64 Years by Report of Any Condom Use in the Past 3 Months, KAIS 2012

Characteristic	Unadjusted OR (95% CI)	*P*	Adjusted OR (95% CI)	*P*
Sex		0.71		
Men	1.0			
Women	0 .95 (0.7–1.3)			
Age group, y		0.67		
15–24	1.0			
25–29	0.9 (0.6–1.3)			
30–39	1.0 (0.7–1.4)			
40–49	0.7 (0.4–1.1)			
50–59	0.7 (0.3–1.6)			
60–64	0.6 (0.1–4.4)			
Education		0.37		
None	1.0			
Incomplete primary	2.0 (0.4–2.9)			
Complete primary	1.1 (0.4–2.9)			
Secondary of higher	1.1 (0.4–2.8)			
Marital status		0.30		
Never married/cohabiting	1.0			
Single	0.5 (0.2–1.4)			
Married/cohabiting	0.8 (0.6–1.1)			
Widowed	0.4 (0.1–2.1)			
Separated Divorced	1.1 (0.6–1.9)			
Household wealth index		0.09		
Lowest	1.0			
Second	2.1 (1.2–3.8)			
Middle	1.8 (1.0–3.2)			
Fourth	1.8 (1.0–3.3)			
Highest	1.4 (0.8–2.6)			
Religion		0.40		
Roman Catholic	1.0			
Protestant/Other	1.2 (0.9–1.7)			
Christian				
Muslim	0.8 (0.4–1.7)			
No religion/other	1.0 (0.4–2.6)			
Residence		0.44		
Rural	1.0			
Urban	0.9 (0.6–1.2)			
Region		0.06		

Characteristic	Unadjusted OR (95% CI)	*P*	Adjusted OR (95% CI)	*P*
Nairobi	1.0			
Central	1.5 (0.8–2.8)			
Coast	0.5 (0.3–1.1)			
Eastern	1.4 (0.7–2.6)			
Nyanza	1.1 (0.7–1.8)			
Rift Valley	0.8 (0.5–1.5)			
Western	1.5 (0.9–2.5)			
Perception of risk		0.15		
No risk	1.0			
Small risk	1.4 (0.9–2.0)			
Moderate risk	1.3 (0.8–2.1)			
Great risk	2.1 (1.1–3.8)			
Known to be infected	1.8 (1.0–3.0)			
Don't know	1.5 (0.9–2.6)			
Self-reported HIV status		0.26		
HIV negative	0.7 (0.4–1.1)			
HIV positive	1.0			
Never tested/received results	0.8 (0.5–1.4)			
No. sex partners in past 12 mo		<0.01		
1 partner	1.0		Referent	—
2 partners	1.4 (1.0–2.0)		1.5 (1.0–2.0)	0.03
3+ partners	2.4 (1.6–3.7)		2.3 (1.5–3.5)	<0.01
Don't know	1.0 (0.1–7.3)		1.0 (0.14–7.8)	0.98
STI symptoms in past 12 mo		<0.01		
Yes	3.0 (1.9–4.5)		Referent	—
No	1.0		2.8 (1.8–4.3)	<0.01
STI diagnosis in past 12 mo		<0.01		
Yes	3.3 (1.3–8.1)			
No	1.0			
Gave or received sex in exchange for money or other commodity		<0.01		
Yes	1.9 (1.2–2.8)			
No	1.0			
Consistent condom use		0.01		
Yes	1.5 (1.1–2.0)			
No	1.0			

OR indicates odds ratio; CI, confidence interval.